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SIMILARITIES OF STRUCTURE SHOW RELATIONSHIP OF MAN AND ANIMALS

A Common Sense View of Evolution

By Dr. R.S. Woodworth,
Professor of Psychology, Columbia University.

While much of the evidence on the evolution question is technical and complicated, there is one broad view of the matter that is plain and simple, and it is this broad, simple view that really makes evolution so appealing an idea to all students of plant and animal life.

As you drive along a country road, you come across a poultry farm where all the chickens are pure white. A little farther along, you see another with all red chickens. You ask how it happens that one farmer has all white chickens, and the other all red; and the answer is that one is incubating eggs from one breed of hens, and the other from another breed. The pure white hens have a common ancestry and are all blood relations. So of the reds, and of any pure breed. If the whites are related to the reds, the relationship is not so close; and you would have to go further back in the pedigree to find the common ancestor. But as we know that various special breeds have sprung from the same general stock of hens, we have good reason to believe that all hens are blood relations. Those of the same breed are closer cousins, those of different breeds more distant cousins; but all hens are cousins.

We can say the same of dogs or pigeons. We know, as a matter of breeding history, where and when the more recent breeds of these domestic animals originated; and we know that those of the same breed are descended from the same ancestors, and are comparatively close cousins, while those of different breeds are more distant cousins.

Now suppose we ask, in an open-minded spirit, whether pigeons are closer cousins to hens or to dogs. The answer cannot be in doubt, once we allow the question to be put. Pigeons and hens have the marks of a common descent. It is quite easy to conceive of two similar species as being related species; once we carry over our knowledge of breeds to the larger and more distinct groups which we call species. Take the "cat family", including lions, tigers, bob-cats, house cats and others. The more we know of their internal anatomy, and of their behavior, the easier it becomes to believe them as a real family, in the sense of being all blood relations. Extending this idea still further, we readily come to believe that all mammals are a family, and all birds another family.

We need, of course, to be on our guard against merely superficial resemblances between different sorts of animals. Penguins and seals have considerable

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resemblance. The penguin doesn't fly any more than the seal runs on four feet; but they both swim and dive most expertly, and in a very similar manner. The penguin has flippers in place of wings, and the seal has them in place of legs. For all that, when carefully studied, the penguin is certainly a bird, and the seal a mammal. That means that the seal and penguin are by no means close relations. The seal is closer to the cat, by descent, and the penguin is closer to the hen. It certainly seems a sensible view, once you get the hang of it.

But if we have reached the point where we think of mammals as one immense but genuine family, and of birds as another similar family, does common sense force us to stop there? Rather, when we come to know the fundamental resemblances between birds and mammals -- in their bones, their muscles, their hearts, their brains -- we are much inclined to believe in a fairly close relationship between birds and mammals, and indeed between all vertebrates, as contrasted with insects, molluscs, or jellyfish. The whole animal kindgom seems made up of several great families, and probably even these are interrelated, if we could trace the ancestry back far enough. As regards plants, the whole idea could be developed there just as easily as in the case of animals.

One big doubt, however, arises. If all mammals, for example, are a true family of cousins, then should we not expect to find all gradations? Should we not be able, with a complete collection of animals at our disposal, from all parts of the world, to arrange a zoo as a long row of cages, passing from the camel to the lion, for example, by small differences without a break anywhere in the series? As a matter of fact, a collection of living animals could not be arranged without leaving many large gaps. But then, ancestral breeds may have died out, leaving derived breeds in possession of the earth. This is not only a natural supposition, but it is a fact, revealed by the fossil remains of the animals of old. The animals of former geological ages were not the animals of today. The horse as we know him did not exist, though horse-like breeds, that may well have been the ancestors of our horses, were then alive.

In considering the family tree of animals, we have to remember that the live species of today are the leaves on the outer twigs. We have before us, alive, only the outer shell of the tree. We cannot see into the interior of the mass of branches; we cannot see, directly, the past condition of the tree. We can partially reconstruct the past of the tree by laboriously digging up the remains of past seasons now lying buried beneath the tree, and piecing them together as well as may be. In spite of the motley array of leaves which we now see on the outside of our family tree, we find, beneath the tree, good evidence that the tree was formerly more uniform than now, that many branches have died, leaving the rest to fill the space, and that all the branches have arisen from the same parent stem.

But does man fit into this scheme of things, and if so where? Well, there is no manner of doubt that man is a mammal. The more you know about his bones, muscles, blood, nervous system, the clearer it becomes that he belongs in the scheme. Nor is there any doubt as to his nearest living cousins; they are certainly the higher primates, the apes. Man is not descended from the chimpanzee, any more than the chimpanzee is descended from man, but they are leaves on the same branch of the family tree.

Fitting man into a place in the general family tree of animals is not humiliating, nor dangerous to morals, It does not lower man in the least; it leaves him just the same as before, with all his distinctive and remarkable qualities. A great artist may have very commonplace cousins, but he is a great artist tremendously. The penguin doesn't fly any more than the [illegible] but they have [illegible] their most [illegible], and in a very [illegible] manner. The penguin [illegible] flippers in place of wings, and the seal has them in place of [illegible]. For all their shape [illegible] studied, the penguin is certainly a bird, and the seal a mammal. Just so we feel the seal and penguin are by no means close relatives. The seal is closer to the [illegible] by descent, and the penguin is closer to the [illegible]. It certainly [illegible] sense, once you get the hang of it.

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just the same. Man's duties and opportunities correspond to his abilities, and are not abated one whit by the fact of his having cousins less highly endowed. All that sort of objection to evolution is not common-sense, to say the least. If the brotherhood of all men is a humane conception, the cousinhood of man and animals is no less so. Once we see that man has an organic place in nature, we have a sense of being at home in the natural world that is a great satisfaction and, I believe, a great spiritual gain.

But, it may finally be asked, what does the Bible teach regarding evolution? It is fair to say that the Bible never raises the question, and consequently cannot be expected to furnish anything like a direct answer. The answer, at the best, would have to be read into some passage by implication, and would always be open to various interpretations. If anything is clear, in reading the Bible, it is that we have here a religious book, a book concerned with man's religious life, and not with natural science. It is not a treatise on biology any more than a treatise on astronomy or chemistry or arithmetic. It leaves these fields entirely aside. How unfair to the Bible, then, how prejudicial to its continued influence, to lug it in and attempt to extort an answer from it on matters which it does not discuss and which lie outside of its chosen field!

APE-MAN BONES REVEAL TWO GARDENS OF EDEN

That there were at least two independent "Gardens of Eden", one in Asia, and one in Africa, in which two or more different varieties of human beings evolved from distinct species of apes, or ape-like animals, is the startling conclusion tentatively reached and announced by Dr. E.A. Hooton of the Peabody Museum of Harvard University after a comparative study of skulls of apes, apemen, cave men and modern men found throughout the world.

The idea that all men originated from one line of ape-like ancestors should be abandoned, Dr. Hooton declared. Southern Asia, southeastern Asia, and Africa all fulfill the conditions necessary for the production of man and the giant apes in an equally satisfactory manner. The fossil and climatic evidence makes it quite possible, he said, that the critical steps in human evolution -- the coming down out of the trees and the assumption of the erect posture -- may have taken place in both Asia and Africa. At present he said that he was inclined to think that one or more of the long-headed varieties of man evolved in Africa and one or more round headed varieties in Asia.

Admitting the existence of two or three fundamental near-man stocks, he said that an occasional hybridization followed by a process of interbreeding would satisfactorily account for the varying characteristics of modern races.

The existence of hybrids between the gorilla and the chimpanzee has been reported several times and is not wholly incredible, Dr. Hooton suggested, and said there was no reason for doubting that the ancestors of man have displayed throughout the process of becoming human, qualities of superior adaptability, greater initiative, and less conservatism in their mating habits as well as in other directions, when compared with the existing big apes or their progenitors.

According to Dr. Hooton's conclusions many kinds of apes left the trees beside the baboon, gorilla, and chimpanzee. Several of these ape-like animals developed toward becoming human beings and several may have succeeded. Dr. Hooton could see nothing in the environmental conditions which kept the gorilla from becoming a man and attributed his failure probably to an inherent incapacity of his family to develop further because of specialization along other lines The baboon lost his chances when he made the fatal choice of walking on four feet instead of two.

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FINDS INTERNAL CANCERS WITH RADIUM PHOTOS

Cancer has apparently received some heavy body-blows in the research laboratories of Europe during recent months, and may possibly be on the verge of a knockout, according to Dr. Erwin F. Smith, U.S.Department of Agriculture specialist on abnormal growths, who has just returned from a tour of cancer investigation centers on the other side of the Atlantic.

Dr. Smith told of two new methods of detecting internal tumors and cancers while they are still in the early stages and therefore more amenable to treatment.

"Drs. Kotzareff and Weyl, of Geneva," said Dr. Smith, "have discovered that if radio-colloidal substances are injected into a cancerous patient there is a selective fixation of the radium in the rapidly multiplying cancer cells. If now a sensitive photographic plate be exposed over the suspected part for some hours, the outline of the tumor is visible on the plate when it is developed. At present the exact composition of the radium colloidal substances is a secret known only to Mr. Weyl.

"The other method of early dagnosis is a serum method discovered by Dr. Botelho, chief of the cancer laboratory of the surgical clinic of Dr. Hartmann in the Hotel Dieu, the great hospital near Notre Dame in Paris. It consists in adding to centrifuged blood serum dilute nitric acid and an iodine reagent. Normal serum and that from non-cancerous patients remains clear after the final treatment. That from cancerous patients remains persistently clouded."

Dr. Smith told of the researches of Dr. Otto Warburg, of Berlin, who has shown that cancer cells can live for long periods without oxygen, provided they have a supply of grape sugar, whereas normal cells must have oxygen. An acid condition arises under these conditions, which is unfavorable to the growth of normal tissue, but does not stop the growth of cancer.

The dispute as to the real cause of cancer continues lively, some scientists holding that it consists merely in the "running wild" of normal body cells, and others contending that there is a definite germ or virus that starts the cells on their career of anarchy. Dr. Smith inclines toward the latter view. He told of the work of Dr. Gye, of London, who took a filterable virus obtained from a chicken sarcoma long cultivated outside the body of its original victim, kept it in glass for a long time, and through a series of dilutions that thinned the original quantity out almost to nothing, and still was able toproduce cancers in experimental animals.

Dr. Gye was unable to find the organism that did the mischief, Dr. Smith stated, but his colleague,Dr. Barnard,was able to demonstrate it by the use of a special microscope able to detect objects as small as four one-millionths of an inch in diameter. "I have been in his laboratory and have seen the body dancing about in the culture fluid," said Dr. Smith. "It is the same type of germ as the pleuropneumonia organism, but smaller."

Another type of bacterium claimed as the cause of certain types of cancer by Dr. Ferdinand Blumenthal, of Berlin, closely resembles the organism responsible for the crowngall disease in plants.

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COLORADO SCIENTIST HUNTS TEN MILLION YEAR OLD INSECTS IN SOUTH AMERICA

Insects buried some ten millions of years are the game to be hunted in South America this summer by Prof. T.D.A. Cockerell of the University of Colorado, one of the world's authorities on fossil insects.

With Mrs. Cockerell, he is now on his way to newly discovered beds of fossils which lie near the Andes in Argentine at Jujuy, and Mendoza. Mrs. Cockerell, who has the discovery of many fossil insects to her credit, will assist him in this search for the "bugs" of long ago.

Nature at times was a good undertaker, often preserving in strata of rocks the molds or actual bodies of insects that lived and died many milleniums ago. These fossils, and others of vegetable life and animal forms, allow the scientist to read from the record of the rocks the story of the development of life on this globe.

Prof. Cockerell is eager to investigate these new natural graveyards of insects since fossil insect deposits are found in only a few places. One of these new fields was laid down in tertiary times, not over five million years ago, when man was only beginning his upward climb to his present estate. The other is of older age and dates back to early Mesozoic times, the age of reptiles, when huge dinosaurs and great flying reptiles roamed and flitted over the face of the earth.

No part of the world affords richer deposits of fossil insects than Colorado. Here the oldest ant and the oldest wasp yet known have been found by expeditions under Dr. Cockerell's direction. The present prospecting for oil shale in Colorado and Wyoming brought these insects to the light of day for they were found in the waste dirt thrown out of miners' excavations. The world's oldest ant represents a very primitive type allied to certain ants of Australia, but the wasp has a very modern aspect. It does not differ materially from those that do their stinging in Colorado today, and this makes it certain that the wasps originated very much earlier in the life of the earth. In these oil shale beds of Eocene age no butterflies and bees have yet been found, but Dr. Cockerell has unearthed many beetles.

From another Colorado locality, the Miocene Florissant beds, near the base of Pike's Peak, more than a thousand kinds of fossil insects have been disinterred.

Insects are among the oldest forms of life found in the rocks laid down in past ages. The first trace of insect life so far discovered was in the Ordovician period of the Paleozoic era, some twenty million years ago.

U.S. RADIUM LABORATORY PRACTISES "SAFETY FIRST"

Radium, charged with several deaths in an Eastern industrial city, has no terrors for the little staff of young women at Washington who handle more of the powerful stuff probably than any one else in the world.

The entire radium supply of the United States has passed through the hands of the testing corps at the U.S. Bureau of Standards for the past five years without a casualty, due to the use of proper precautions in its handling, according to Miss C.L.Torrey, assistant physicist at the radium laboratory of the Bureau. The work of testing the country's radium supply is under the direction

of Dr. Paul D. Foote, with Miss Torrey in immediate charge of the laboratory.

"During the early days of testing," Miss Torrey stated, "incautious exposure to the radiations from the tubes sometimes had bad effects. In addition to the direct burns, anemia and other blood disturbances were caused, as well as severe upsetting of certain elements of the glandular system. However, through the cooperation of the U.S. Public Health Service, these conditions were quickly overcome, and a complete system of safeguards installed. I do not believe that any place in this country where radium is handled is as well protected as this laboratory. Due to careful observance of our safety rules, we have gone through the past five years without any ill effects that I know of.

"From the moment of its arrival until it leaves the laboratory, and through every stage of the testing, every tube of radium is handled by the same safety routine. The bench where the packing and unpacking is done has a heavy iron shield that comes up to the chin of the worker, so that only the hands and face are exposed even for a short time. The tubes are never lifted with the fingers; we always use six-inch forceps. When we have to carry a tube for more than a moment or two, we place it in a closed wooden holder, or if we are carrying one of the lead-lined boxes of tubes we place it at the bottom of a bucket. The tubes are stored in a heavy safe, with an additional lining of lead plates inside.

"In the actual testing, brief exposures are unavoidable. Partly on this account, and partly because the observation of the testing electroscope involves considerable eyestrain, the observer never works more than half a day at a stretch on the testing, finding other occupations for the rest of the time.

"The health of the testing staff is carefully watched by the Public Health Service. Every couple of months they make blood counts, and once a year we each go through a thorough physical examination.

"We are not handling quite so much radium now as we did three or four years ago. Still, last year we tested a total of about eighteen grams, and this year about twelve, which is quite a lot, as quantities go in radium.

"There is no reason why any one should suffer in health from handling radium, if only proper safety measures are taken."

LARGE LUNG CAPACITY NOT SURE PROTECTION

Contrary to popular belief, barrel chested individuals are not always perfectly healthy. Large lung capacity is not necessarily certain protection against diseases of the heart and lungs, is the statement of Dr. J.A. Meyers of the University of Minnesota Medical School.

In his book, "The Vital Capacity of the Lungs", which will soon be published, Dr. Meyers reports the results of his six years of experimental work and study on the lung capacity test as a means of medical diagnosis.

Some of the persons examined revealed a vital lung capacity of as much or more than 125 per cent. of the normal vital capacity. Usually, these are people who have done hard labor, such as farm work, or who have been active in athletics, or have trained their voices for singing, or have played some wind instrument over a considerable length of time.

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Strangely enough, some individuals were found who presented no history of strenuous exercise, who were tall and thin with long chest and low diaphragms yet who had a lung capacity greater than normal.

Many people who were known to have 125 per cent. or more of normal lung capacity developed serious diseases of the heart or lungs. Upon later examination it was found that the disease in many instances had decreased the lung capacity of the individual and still left him with more than 100 per cent. of normal capacity.

Dr. Meyer further states, however, that a decrease in an individual's normal lung capacity is an indication of the presence of some disease condition, usually a disease of the heart or lungs, and offers a valuable diagnostic test.

EXPLAINSINHERITANCE OF MENTAL CHARACTERS

"Brains" of the first class are passed on from parent to child in sections, not in one piece; so also is stupidity. This is the gist of a new theory on the mode of the inheritance of mental traits, advanced at the meeting of the Eugenics Research Association by Prof. Harrison R. Hunt of Michigan State College.

According to Prof. Hunt, the idea generally accepted at present, that intelligence or its lack acts as a single unit character in inheritance, is inadequate to explain the obvious gradations in intelligence, and also to account for the appearance in a family of children either much brighter or much duller than their parents.

Prof. Hunt assumes at least five pairs of hereditary characters that have to do with the passing on of intelligence. If both parents are persons of high intelligence, and possessed of all five pairs of these characters, their children will also average very high. If they are idiots, having none of the pairs of characters, their children also will be idiots. Intermediate conditions representing people of good average intelligence but not geniuses, will produce a mixture of offspring types, with occasional exceptional children, and once in a while also offspring of low mentality.

GREATNESS NOT DEPENDENT ON POSITION IN FAMILY

It makes no difference in your chances for getting into "Who's Who" whether you were the first child in the family or the fifteenth. Greatness, like the wind, "goeth whither it listeth" according to statistical studies of eminent persons reported to the Eugenics Research Association by Dr. Wilhelmine E. Key, of Battle Creek, Michigan. Her researches were occasioned by the conflicting claims of other students, some of whom claimed that elder sons became great men, while others contended that the latest-born had the best chances of achieving eminence.

Dr. Key studied the family records of a number of eminent Americans, ranging from Alexander Hamilton and John Quincy Adams to Mark Twain and Augustus St. Gaudens, and found that in the long run it apparently makes no difference what a person's birth-rank or position among his brothers and sisters may be, or what were the ages of his parents when he was born.

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"James Fenimore Cooper was the eleventh of twelve children," Dr. Key states. "On the other hand, James Madison was the eldest of twelve." General Sherman came exactly in the middle of a large family, being sixth in a group of eleven. Numerous other examples give equally dissimilar rankings, and statistical curves seem to indicate merely the application of the regular law of averages both to position in family and age of parents.

NAVY ASTRONOMER PLANNING FOR NEXT ECLIPSE

Naval vessels will be put to scientific uses when a party of astronomers from the U.S. Naval Observatory sails from San Francisco on September 1 for Manila, en route to Sumatra, where they will observe an eclipse of the sun January 14, 1926, according to Captain F.B. Littell, who will be in charge of the expedition. The scientific apparatus to be taken along has already been shipped from the observatory, Capt. Littell said, as it will be taken by way of the Panama Canal to San Francisco, and will be picked up before they sail.

In addition to Capt. Littell, the party will include Prof. George H. Peters, associate astronomer, and G.M.Raynsford, assistant astronomer, both of the observatory staff, and Dr. John M. Anderson of the Mt. Wilson Observatory, of California. A number of sailors will also accompany the party and will assist in the erection of the apparatus. The chief instrument to be used is a camera 65 feet long which will be built in Sumatra. Lumber will be transported from the United States, however, as bamboo is the chief form used in Sumatra, and it is not suitable. Another camera of 113 inches length will be used as well as several smaller ones.

The exact location of the camp has not been determined, but according to the present plans, the party will proceed first to Palembang by boat, and from there a railroad may be taken to Lahat, in the interior. This is about 30 miles from Tebingtinggi, one of the sites being considered, but it is not known whether transportation to the point will be easily available. This is about 100 miles from Benkoelen, on the west coast, where a party from the Sproul Observatory of Swarthmore College will make their headquarters.

This eclipse is more favorable than the one that occurred last January in New England because the sun is higher in the sky and it lasts several minutes longer. The chances for clear weather are not much better, however, for Capt. Littell stated that they are about 60 to 40 in favor of clouds at the crucial moment.

COLLEGE GIRLS SHOW SPEECH DEFECTS

That detection and correction of speech defects in college students is an important factor in eliminating handicaps which might persist in later life is the conclusion of Doctor Sara M. Stinchfield, of Mount Holyoke College, in a report in the Journal of Applied Psychology.

Five hundred freshman college women entering Mount Holyoke were submitted to standardized tests in voice and speech. Serious cases of lisping, stuttering and indistinct utterance were found, and personality difficulties due to speech disorders were discovered. About one sixth of the entire freshman class were found to have speech defects.

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From the standpoint of articulation the most frequent causes of failure is the tests were the provincialisms and local dialects in New England and the middle Atlantic states, the inverted "r" of the middle West and the quality of the southern vowels. A high perçentage of inaccuracies on "s" and "z" sounds and their combinations were found. Lack of proper breath control and rhythm were responsible for some faults.

On the whole, students from private schools did better than those from public schools, and those who had had a little speech training seemed to pass the tests more easily than those who had received none.

Those students in whom speech defects were found were assigned to special classes in which the defects were overcome by proper training before the college course was completed.

TABLOID BOOK REVIEW

QUO VADIMUS? Some Glimpses of the Future. By E.E. Fournier d'Albe. New York, E.P.Dutton and Company, $1.00.

Dutton's "Today and Tomorrow" series of science booklets that started off with a bang by Haldane's "Daedalus" keeps up its interest like a serial story. Each successive issue presents a new problem and forecasts new solutions, after the manner of a well constructed detective tale.

In the latest, Dr. Fournier d'Albe guesses what the world will be a thousand and even a million years hence. By 2925 we shall see "A globe laid out like a huge garden, with a climate under perfect control, the internal heat of the earth brought to the surface and utilized as a source of never-failing energy. Portions of the interior of the earth reclaimed and made habitable; all machinery and sources of power wisely distributed and made instantly available for all legitimate purposes. The earth's surface and the rippling ether in which it swims made into a vast playground of human thought and emotion, and all mankind throbbing in unison to every great thought. The earth will have become a sentient being. Mankind will be the grey matter of its brain."

E.E. Slosson

SPACE AND TIME by Carl Benedicks, with an introduction by Sir Oliver Lodge, New York: E.P. Dutton and Company.

An original contribution to the Einstein controversy by a former professor of physics at the University of Stockholm. He is unwilling to accept the startling consequences of the theory of relativity, so he takes the other alternative, almost equally startling, of reverting to the corpuscular theory of light emission, in place of the prevailing theory of ether waves. In place of Einstein he follows Ritz, the Swiss mathematician.

E.E. Slosson

The moons of the planet Jupiter were the first astronomical objects to be discovered with the use of a telescope.

The African Gold Coast furnishes half of the world's supply of cocoa.

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hood of man and animals is no less so. Once we see that man has place in nature, we have a sense of being at home in the natural world that is a great satisfaction and, I believe, a great spiritual gain.

But, it may finally be asked, what does the Bible teach regarding evolution? It is fair to say that the Bible never raises the question, and consequently cannot be expected to furnish anything like a direct answer. The answer, at the best, would have to be read into some passage by implication, and would always be open to various interpretations. If anything is clear, in reading the Bible, it is that we have here a religious book, a book concerned with man's religious life, and not with natural science. It is not a treatise on biology any more than a treatise on astronomy or chemistry or arithmetic. It leaves these fields entirely aside. How unfair to the Bible, then, how prejudicial to its continued influence, to lug it in and attempt to extort an answer from it on matters which it does not discuss and which lie outside of its chosen field!

APE-MAN BONES REVEAL TWO GARDENS OF EDEN

That there were at least two independent "Gardens of Eden", one in Asia, and one in Africa, in which two or more different varieties of human beings evolved from distinct species of apes, or ape-like animals, is the startling conclusion tentatively reached and announced by Dr. E.A. Hooton of the Peabody Museum of Harvard University after a comparative study of skulls of apes, ape-men, cave men and modern men found throughout the world.

The idea that all men originated from one line of ape-like ancestors should be abandoned, Dr. Hooton declared. Southern Asia, southeastern Asia, and Africa all fulfill the conditions necessary for the production of man and the giant apes in an equally satisfactory manner. The fossil and climatic evidence makes it quite possible, he said, that the critical steps in human evolution -- the coming down out of the trees and the assumption of the erect posture -- may have taken place in both Asia and Africa. At present he said that he was inclined to think that one or more of the long-headed varieties of man, evolved in Africa and one or more round headed varieties in Asia.

Admitting the existence of two or three fundamental near-man stocks, he said that an occasional hybridization followed by a process of interbreeding would satisfactorily account for the varying characteristics of modern races.

The existence of hybrids between the gorilla and the chimpanzee has been reported several times and is not wholly incredible, Dr. Hooton suggested, and said there was no reason for doubting that the ancestors of man have displayed throughout the process of becoming human, qualities of superior adaptability, greater initiative, and less conservatism in their mating habits as well as in other directions, when compared with the existing big apes or their progenitors.

According to Dr. Hooton's conclusions many kinds of apes left the trees beside the baboon, gorilla, and chimpanzee. Several of these ape-like animals developed toward becoming human beings and several may have succeeded. Dr. Hooton could see nothing in the environmental conditions which kept the gorilla from becoming a man and attributed his failure probably to an inherent incapacity of his family to develop further because of specialization along other lines The baboon lost his chances when he made the fatal choice of walking on four feet instead of two.

OUR DAILY BREAD

By Dr. Edwin E. Slosson.

The white man is habituated to wheat bread, while the yellow race is accustomed to the more expensive and less nutritious rice, and the black race may get along on corn or manioc, the amazing expansion of the whites in recent centuries has been made possible by the extension of the area devoted to wheat and by improved methods of cultivation.

The vital question then arises how long can this expansion keep up without a shortage of our daily bread. Professor Griffith Taylor of Sydney University has figured out that if the white people fill the regions of the world open to them as densely as Europe is now populated, relatively to their resources, they would number about 1,340 million, of which North America would hold 700,000,000, Europe 400,000,000, South America 100,000,000, South Africa 80,000,000, and Australia 60,000,000.

But the food supply from any conceivable sources would not nearly suffice for such a number. According to the calculations of Professor Raymond Pearl of Johns Hopkins the food shortage would become serious in about two centuries.

A similar conclusion is reached by O.E. Baker, economist of the U.S. Department of Agriculture, in a careful study of "The Potential Supply of Wheat" in the first issue of Economic Geography. He foresees an increase of the white race from four hundred millions at present to double that at the end of the century. They would require some 7,400 million bushels of wheat a year, or almost treble the present production of the white man's world.

This requirement might theoretically be met, for about one acre in ten of the land area of the earth will grow wheat and less than one acre in a hundred is now devoted to that crop. But it is not likely that more than three per cent. of the land will ever be used for wheat growing. And to meet the need of such an expanding population for much longer than a century would demand more efficiency and energy, more of a spirit of peace and cooperation than the human race has yet shown. Judging by the past history, it is more likely that increased crowding will lead to a gradual lowering of the standard of living or to catastrophic wars and famines. As regards our own country Mr. Baker's conclusion is:

> "Not many people will starve; but, as in Europe recently, the death rates will rise, especially the infant death rates, while the hours of labor will lengthen and the lower standard of living will make people more susceptible to disease.
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> "It is certain that if the population of the United States continues to increase for more than another century as it has during the past century, there is no means by which the present standard of living can be maintained, except by importation of foodstuffs from other lands - which will need their foodstuffs even more than we. And looking forward 200 or 300 years, which is a shorter span of time than that elapsed since the settlements of Jamestown and Plymouth, it seems necessary to recognize not only a stationary population in this country, but also throughout the world. Whether this stationary state will be one of misery for the majority of the people, as in China and India today, or one of well-being and happiness will depend largely upon voluntary restriction of population."

FINDS INTERNAL CANCERS WITH RADIUM PHOTOS

Cancer has apparently received some heavy body-blows in the research laboratories of Europe during recent months, and may possibly be on the verge of a knockout, according to Dr. Erwin F. Smith, U.S.Department of Agriculture specialist on abnormal growths, who has just returned from a tour of cancer investigation centers on the other side of the Atlantic.

Dr. Smith told of two new methods of detecting internal tumors and cancers while they are still in the early stages and therefore more amenable to treatment.

"Drs. Kotzareff and Weyl, of Geneva," said Dr. Smith, "have discovered that if radio-colloidal substances are injected into a cancerous patient there is a selective fixation of the radium in the rapidly multiplying cancer cells. If now a sensitive photographic plate be exposed over the suspected part for some hours, the outline of the tumor is visible on the plate when it is developed. At present the exact composition of the radium colloidal substances is a secret known only to Mr. Weyl.

"The other method of early dagnosis is a serum method discovered by Dr. Botelho, chief of the cancer laboratory of the surgical clinic of Dr. Hartmann in the Hotel Dieu, the great hospital near Notre Dame in Paris. It consists in adding to centrifuged blood serum dilute nitric acid and an iodine reagent. Normal serum and that from non-cancerous patients remains clear after the final treatment. That from cancerous patients remains persistently clouded."

Dr. Smith told of the researches of Dr. Otto Warburg, of Berlin, who has shown that cancer cells can live for long periods without oxygen, provided they have a supply of grape sugar, whereas normal cells must have oxygen. An acid condition arises under these conditions, which is unfavorable to the growth of normal tissue, but does not stop the growth of cancer.

The dispute as to the real cause of cancer continues lively, some scientists holding that it consists merely in the "running wild" of normal body cells, and others contending that there is a definite germ or virus that starts the cells on their career of anarchy. Dr. Smith inclines toward the latter view. He told of the work of Dr. Gye, of London, who took a filterable virus obtained from a chicken sarcoma long cultivated outside the body of its original victim, kept it in glass for a long time, and through a series of dilutions that thinned the original quantity out almost to nothing, and still was able toproduce cancers in experimental animals.

Dr. Gye was unable to find the organism that did the mischief, Dr. Smith stated, but his colleague,Dr. Barnard,was able to demonstrate it by the use of a special microscope able to detect objects as small as four one-millionths of an inch in diameter. "I have been in his laboratory and have seen the body dancing about in the culture fluid," said Dr. Smith. "It is the same type of germ as the pleuropneumonia organism, but smaller."

Another type of bacterium claimed as the cause of certain types of cancer by Dr. Ferdinand Blumenthal, of Berlin, closely resembles the organism responsible for the crowngall disease in plants.

COLORADO SCIENTIST HUNTS TEN MILLION YEAR OLD INSECTS IN SOUTH AMERICA

Insects buried some ten millions of years are the game to be hunted in South America this summer by Prof. T.D.A. Cockerell of the University of Colorado, one of the world's authorities on fossil insects.

With Mrs. Cockerell, he is now on his way to newly discovered beds of fossils which lie near the Andes in Argentine at Jujuy, and Mendoza. Mrs. Cockerell, who has the discovery of many fossil insects to her credit, will assist him in this search for the "bugs" of long ago.

Nature at times was a good undertaker, often preserving in strata of rocks the molds or actual bodies of insects that lived and died many milleniums ago. These fossils, and others of vegetable life and animal forms, allow the scientist to read from the record of the rocks the story of the development of life on this globe.

Prof. Cockerell is eager to investigate these new natural graveyards of insects since fossil insect deposits are found in only a few places. One of these new fields was laid down in tertiary times, not over five million years ago, when man was only beginning his upward climb to his present estate. The other is of older age and dates back to early Mesozoic times, the age of reptiles, when huge dinosaurs and great flying reptiles roamed and flitted over the face of the earth.

No part of the world affords richer deposits of fossil insects than Colorado. Here the oldest ant and the oldest wasp yet known have been found by expeditions under Dr. Cockerell's direction. The present prospecting for oil shale in Colorado and Wyoming brought these insects to the light of day for they were found in the waste dirt thrown out of miners' excavations. The world's oldest ant represents a very primitive type allied to certain ants of Australia, but the wasp has a very modern aspect. It does not differ materially from those that do their stinging in Colorado today, and this makes it certain that the wasps originated very much earlier in the life of the earth. In these oil shale beds of Eocene age no butterflies and bees have yet been found, but Dr. Cockerell has unearthed many beetles.

From another Colorado locality, the Miocene Florissant beds, near the base of Pike's Peak, more than a thousand kinds of fossil insects have been disinterred.

Insects are among the oldest forms of life found in the rocks laid down in past ages. The first trace of insect life so far discovered was in the Ordovician period of the Paleozoic era, some twenty million years ago.

U.S. RADIUM LABORATORY PRACTISES "SAFETY FIRST"

Radium, charged with several deaths in an Eastern industrial city, has no terrors for the little staff of young women at Washington who handle more of the powerful stuff probably than any one else in the world.

The entire radium supply of the United States has passed through the hands of the testing corps at the U.S. Bureau of Standards for the past five years without a casualty, due to the use of proper precautions in its handling, according to Miss C.L.Torrey, assistant physicist at the radium laboratory of the Bureau. The work of testing the country's radium supply is under the direction of Dr. Paul D. Foote, with Miss Torrey in immediate charge of the laboratory.

"During the early days of testing," Miss Torrey stated, "incautious exposure to the radiations from the tubes sometimes had bad effects. In addition to the direct burns, anemia and other blood disturbances were caused, as well as severe upsetting of certain elements of the glandular system. However, through the cooperation of the U.S. Public Health Service, these conditions were quickly overcome, and a complete system of safeguards installed. I do not believe that any place in this country where radium is handled is as well protected as this laboratory. Due to careful observance of our safety rules, we have gone through the past five years without any ill effects that I know of.

"From the moment of its arrival until it leaves the laboratory, and through every stage of the testing, every tube of radium is handled by the same safety routine. The bench where the packing and unpacking is done has a heavy iron shield that comes up to the chin of the worker, so that only the hands and face are exposed even for a short time. The tubes are never lifted with the fingers; we always use six-inch forceps. When we have to carry a tube for more than a moment or two, we place it in a closed wooden holder, or if we are carrying one of the lead-lined boxes of tubes we place it at the bottom of a bucket. The tubes are stored in a heavy safe, with an additional lining of lead plates inside.

"In the actual testing, brief exposures are unavoidable. Partly on this account, and partly because the observation of the testing electroscope involves considerable eyestrain, the observer never works more than half a day at a stretch on the testing, finding other occupations for the rest of the time.

"The health of the testing staff is carefully watched by the Public Health Service. Every couple of months they make blood counts, and once a year we each go through a thorough physical examination.

"We are not handling quite so much radium now as we did three or four years ago. Still, last year we tested a total of about eighteen grams, and this year about twelve, which is quite a lot, as quantities go in radium.

"There is no reason why any one should suffer in health from handling radium, if only proper safety measures are taken."

LARGE LUNG CAPACITY NOT SURE PROTECTION

Contrary to popular belief, barrel chested individuals are not always perfectly healthy. Large lung capacity is not necessarily certain protection against diseases of the heart and lungs, is the statement of Dr. J.A. Meyers of the University of Minnesota Medical School.

In his book, "The Vital Capacity of the Lungs", which will soon be published, Dr. Meyers reports the results of his six years of experimental work and study on the lung capacity test as a means of medical diagnosis.

Some of the persons examined revealed a vital lung capacity of as much or more than 125 per cent. of the normal vital capacity. Usually, these are people who have done hard labor, such as farm work, or who have been active in athletics, or have trained their voices for singing, or have played some wind instrument over a considerable length of time.

Strangely enough, some individuals were found who presented no history of strenuous exercise, who were tall and thin with long chest and low diaphragms, yet who had a lung capacity greater than normal.

Many people who were known to have 125 per cent. or more of normal lung capacity developed serious diseases of the heart or lungs. Upon later examination it was found that the disease in many instances had decreased the lung capacity of the individual and still left him with more than 100 per cent. of normal capacity.

Dr. Meyer further states, however, that a decrease in an individual's normal lung capacity is an indication of the presence of some disease condition, usually a disease of the heart or lungs, and offers a valuable diagnostic test.

EXPLAINSINHERITANCE OF MENTAL CHARACTERS

"Brains" of the first class are passed on from parent to child in sections, not in one piece; so also is stupidity. This is the gist of a new theory on the mode of the inheritance of mental traits, advanced at the meeting of the Eugenics Research Association by Prof. Harrison R. Hunt of Michigan State College.

According to Prof. Hunt, the idea generally accepted at present, that intelligence or its lack acts as a single unit character in inheritance, is inadequate to explain the obvious gradations in intelligence, and also to account for the appearance in a family of children either much brighter or much duller than their parents.

Prof. Hunt assumes at least five pairs of hereditary characters that have to do with the passing on of intelligence. If both parents are persons of high intelligence, and possessed of all five pairs of these characters, their children will also average very high. If they are idiots, having none of the pairs of characters, their children also will be idiots. Intermediate conditions representing people of good average intelligence but not geniuses, will produce a mixture of offspring types, with occasional exceptional children, and once in a while also offspring of low mentality.

GREATNESS NOT DEPENDENT ON POSITION IN FAMILY

It makes no difference in your chances for getting into "Who's Who" whether you were the first child in the family or the fifteenth. Greatness, like the wind, "goeth whither it listeth" according to statistical studies of eminent persons reported to the Eugenics Research Association by Dr. Wilhelmine E. Key, of Battle Creek, Michigan. Her researches were occasioned by the conflicting claims of other students, some of whom claimed that elder sons became great men, while others contended that the latest-born had the best chances of achieving eminence.

Dr. Key studied the family records of a number of eminent Americans, ranging from Alexander Hamilton and John Quincy Adams to Mark Twain and Augustus St. Gaudens, and found that in the long run it apparently makes no difference what a person's birth-rank or position among his brothers and sisters may be, or what were the ages of his parents when he was born.

"James Fenimore Cooper was the eleventh of twelve children," Dr. Key states. "On the other hand, James Madison was the eldest of twelve." General Sherman came exactly in the middle of a large family, being sixth in a group of eleven. Numerous other examples give equally dissimilar rankings, and statistical curves seem to indicate merely the application of the regular law of averages both to position in family and age of parents.

NAVY ASTRONOMER PLANNING FOR NEXT ECLIPSE

Naval vessels will be put to scientific uses when a party of astronomers from the U.S. Naval Observatory sails from San Francisco on September 1 for Manila, en route to Sumatra, where they will observe an eclipse of the sun January 14, 1926, according to Captain F.B. Littell, who will be in charge of the expedition. The scientific apparatus to be taken along has already been shipped from the observatory, Capt. Littell said, as it will be taken by way of the Panama Canal to San Francisco, and will be picked up before they sail.

In addition to Capt. Littell, the party will include Prof. George H. Peters, associate astronomer, and G.M.Raynsford, assistant astronomer, both of the observatory staff, and Dr. John M. Anderson of the Mt. Wilson Observatory, of California. A number of sailors will also accompany the party and will assist in the erection of the apparatus. The chief instrument to be used is a camera 65 feet long which will be built in Sumatra. Lumber will be transported from the United States, however, as bamboo is the chief form used in Sumatra, and it is not suitable. Another camera of 113 inches length will be used as well as several smaller ones.

The exact location of the camp has not been determined, but according to the present plans, the party will proceed first to Palembang by boat, and from there a railroad may be taken to Lahat, in the interior. This is about 30 miles from Tebingtinggi, one of the sites being considered, but it is not known whether transportation to the point will be easily available. This is about 100 miles from Benkoelen, on the west coast, where a party from the Sproul Observatory of Swarthmore College will make their headquarters.

This eclipse is more favorable than the one that occurred last January in New England because the sun is higher in the sky and it lasts several minutes longer. The chances for clear weather are not much better, however, for Capt. Littell stated that they are about 60 to 40 in favor of clouds at the crucial moment.

COLLEGE GIRLS SHOW SPEECH DEFECTS

That detection and correction of speech defects in college students is an important factor in eliminating handicaps which might persist in later life is the conclusion of Doctor Sara M. Stinchfield, of Mount Holyoke College, in a report in the Journal of Applied Psychology.

Five hundred freshman college women entering Mount Holyoke were submitted to standardized tests in voice and speech. Serious cases of lisping, stuttering and indistinct utterance were found, and personality difficulties due to speech disorders were discovered. About one sixth of the entire freshman class were found to have speech defects.

From the standpoint of articulation and most frequent causes of failure i the tests were the provincialisms and local dialects in New England and the middle Atlantic states, the inverted "r" of the middle West and the quality of the southern vowels. A high percentage of inaccuracies on "s" and "z" sounds and their combinations were found. Lack of proper breath control and rhythm were responsible for some faults.

On the whole, students from private schools did better than those from public schools, and those who had had a little speech training seemed to pass the tests more easily than those who had received none.

Those students in whom speech defects were found were assigned to special classes in which the defects were overcome by proper training before the college course was completed.

TABLOID BOOK REVIEW

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